

IN THE CLAIMS:

This listing of claims will replace all prior versions, and listings, of claims in the application.

1. (Currently Amended) A lithographic projection apparatus comprising:
 - a support structure configured to hold a patterning device, the patterning device configured to pattern a projection beam according to a desired pattern;
 - a substrate table configured to hold a substrate;
 - a projection system configured to project the patterned beam onto a target portion of the substrate;
 - a liquid supply system configured to at least partly fill a space between the projection system and said substrate with liquid; and
 - a selective heater configured to selectively control the temperature, ~~and therefore size,~~ of bubbles ~~of a particular composition~~ in the liquid without substantially changing the temperature of the liquid.
2. (Previously Presented) A lithographic projection apparatus according to claim 1, further comprising a bubble detector.
3. (Previously Presented) A lithographic projection apparatus according to claim 2, wherein said bubble detector comprises at least one ultrasonic transducer, the attenuation of ultrasonic waves in said liquid being measured by said transducer so as to obtain information about bubbles present in said liquid.
4. (Original) A lithographic projection apparatus according to claim 3 wherein said ultrasonic transducer measures ultrasonic attenuation as a function of frequency.
5. (Previously Presented) A lithographic projection apparatus according to claim 1, further comprising a bubble removal device.
6. (Previously Presented) A lithographic projection apparatus according to claim 5, wherein said bubble removal device comprises a degassing device, said degassing device

comprising an isolation chamber, wherein a space above liquid in said isolation chamber is maintained at a pressure below atmospheric pressure encouraging previously dissolved gases to come out of solution and be pumped away.

7. (Previously Presented) A lithographic projection apparatus according to claim 5, wherein said bubble removal device is configured to provide a continuous flow of liquid over a final element of said projection system and said substrate to transport bubbles in said liquid out of said space between said projection system and said substrate.

8. (Previously Presented) A lithographic projection apparatus according to claim 1, further comprising a liquid pressurization device to pressurize said liquid above atmospheric pressure to minimize the size of bubbles and encourage bubble-forming gases to dissolve into said liquid.

9. (Original) A lithographic projection apparatus according to claim 1, wherein the composition of said liquid is chosen to have a lower surface tension than water.

10. (Previously Presented) A lithographic projection apparatus according to claim 1, wherein a bubble detector, a bubble removal device, or both, is configured to treat said liquid before it is supplied to said space between said projection system and said substrate.

11. (Original) A lithographic projection apparatus according to claim 10, wherein the treated liquid is kept in a sealed container, excess space in said sealed container being filled with one or more of the following: nitrogen gas, argon gas, helium gas or a vacuum.

12. (Original) A lithographic projection apparatus according to claim 3, wherein an ultrasonic transducer is arranged in a pulse-echo configuration, said transducer acting both to transmit ultrasonic waves and, after reflection, to receive ultrasonic waves that have been attenuated during propagation along a path through said liquid.

13. (Previously Presented) A lithographic projection apparatus according to claim 3, wherein said bubble detector comprises two spatially separated ultrasonic transducers, the

first arranged to transmit ultrasonic waves, and the second to receive ultrasonic waves that have been attenuated during propagation along a path through said liquid between the two transducers.

14. (Previously Presented) A lithographic projection apparatus according to claim 5, wherein said bubble removal device includes two spatially separated ultrasonic transducers, arranged to produce ultrasonic standing-wave patterns within said liquid which trap bubbles within the nodal regions, said bubble removal device being arranged to displace said bubbles through the use of a phase-adjusting device linked with said transducers, said phase-adjusting device causing spatial shift of nodal regions and bubbles trapped therein.

15. (Previously Presented) A lithographic projection apparatus according to claim 5, wherein said bubble removal device comprises an electric field generator configured to apply an electric field to said liquid, said electric field being capable of dislodging bubbles attached to said substrate.

16. (Cancelled)

17. (Previously Presented) A lithographic projection apparatus according to claim 1, wherein said selective heater comprises a microwave source.

18. (Cancelled)

19. (Cancelled)

20. (Previously Presented) A lithographic projection apparatus according to claim 2, wherein said bubble detector comprises a light source, a light detector and a light comparator, said light source and said light detector being arranged so that light emitted by said source propagates between said source and said detector through a portion of said liquid, said comparator being arranged to detect changes in the proportion of said emitted light that arrives at said detector after propagation through a portion of said liquid.

21. (Cancelled)

22. (Cancelled)

23. (Currently Amended) A device manufacturing method comprising:
at least partly filling a space between a projection system of a lithographic apparatus and a substrate with liquid;
projecting a patterned radiation beam using the projection system, through the liquid, onto a target portion of a substrate; and
selectively controlling the temperature, ~~and therefore size, of bubbles of a particular composition~~ in the liquid without substantially changing the temperature of the liquid.

24. (Cancelled)

25. (Previously Presented) A lithographic projection apparatus according to claim 1, further comprising a liquid quality monitor capable of switching the operational state of the projection apparatus between an active state and a suspended state, the active state being selected when the liquid quality is determined to be above a predefined threshold and the suspended state being selected when the liquid quality is determined to be below a predefined threshold state.

26. (Previously Presented) A device manufacturing method according to claim 23, wherein selectively controlling the temperature comprises heating using a microwave source.

27. (Previously Presented) A device manufacturing method according to claim 23, further comprising producing ultrasonic standing-wave patterns within the liquid which trap bubbles within the nodal regions and causing spatial shift of the nodal regions to displace the trapped bubbles.

28. (Currently Amended) A lithographic projection apparatus comprising:
a support structure configured to hold a patterning device, the patterning device configured to pattern a projection beam according to a desired pattern;

a substrate table configured to hold a substrate;
a projection system configured to project the patterned beam onto a target portion of the substrate;
a liquid supply system configured to at least partly fill a space between the projection system and the substrate with liquid;
a particle input device configured to controllably introduce particles into the liquid;
and
a particle removal device configured to remove the particles from the liquid.

29. (Previously Presented) A lithographic projection apparatus according to claim 28, wherein the particles comprise a surface with characteristics that encourage bubbles to attach thereto.

30. (Previously Presented) A lithographic projection apparatus according to claim 28, further comprising at least one ultrasonic transducer, the attenuation of ultrasonic waves in said liquid being measured by said transducer so as to obtain information about bubbles present in said liquid.